



CONFIDENTIAL.

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# CANADIAN PACIFIC RAILWAY.

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## REPORTS

IN REFERENCE TO

## LOCATION OF SECOND SECTION

WEST OF

## RED RIVER.

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1880.

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CONFIDENTIAL.

CANADIAN PACIFIC RAILWAY.

OFFICE OF THE ENGINEER-IN-CHIEF,

OTTAWA, January 15th, 1880.

The Honorable

Sir CHARLES TUPPER, K.C.M.G.,

Minister of Railways and Canals.

SIR,

I have the honor to report on the surveys which have been made last summer, immediately to the west of the Province of Manitoba, with the view of locating the railway west of the Riding Mountains and commencing construction on the "second one hundred mile section."

The Government having determined to change the location of that portion of the line from Selkirk, via the Narrows of Lake Manitoba to Livingstone, and establish a line which would, generally, follow the course of settlement, due westerly through the Province of Manitoba, it became my duty to have an instrumental survey made through the district. The service was placed in the hands of Mr. Marcus Smith, to whom I furnished the instructions appended.

Acting on these instructions, two lines have been surveyed, both commencing near the western boundary of the Province of Manitoba. One extends westerly, the other north-westerly. Both surveys are, however, incomplete, the winter having closed in and stopped further operations. The continuous measurements on the western line are limited to 110 miles, terminating at a point about four miles beyond Fort Ellice; those on the north-western line, at Bird Tail Creek, at a crossing a little south of the sixth base line and 105 miles from the common place of beginning.

The country has been explored and some examinations have been made beyond Fort Ellice and Bird Tail Creek, but the two chains of instrumental measurements terminate at the points above mentioned. The distance unsurveyed from these points to a common point of intersection on the located line (some 60 miles west of Livingstone) may be estimated at about 150 miles.

Surveys were made in 1877 which shewed "that the bridging of the valleys of Bird Tail Creek, Shell River and the Assiniboine, would be so enormously heavy as to render construction" on the line then defined inexpedient. During the past summer, another line (the western line) was projected to enter the valley of the Assiniboine below the mouth of Bird Tail Creek, thence up the Assiniboine to its junction with the Qu'Appelle.

A third line (the north-western line) was surveyed during last summer, commencing at a common starting point and following the western line about 8 miles west of the western boundary of Manitoba, it then diverges to the north-west in a straight course to the Little Saskatchewan, where the northern trail crosses (Tanners' Crossing), and thence in a nearly northwesterly direction to Bird Tail Creek. From Bird Tail Creek the line is projected in a northerly course towards Duck Mountain with the view of getting a practicable crossing of Shell River. From Shell River the line is projected in a north-westerly direction, but the survey has not been extended further.

For detailed descriptions of these two lines—the western and the north-western—I beg to refer to the report of Mr. Smith, of date 30th December last. The surveys, as far as they have been extended, have been made with care and judgment, in proof of which, points have been found on the deep and exceptionally wide valleys which traverse the country, where the crossings, although still somewhat formidable, do not appear so objectionable as those previously reported.

On the Western Line the principal gradients are as follows :—

|                                                  | CHARACTER OF GRADIENTS. |        |                     |
|--------------------------------------------------|-------------------------|--------|---------------------|
|                                                  | Rate per mile.          | Length | Total rise or fall. |
|                                                  | Feet.                   | Miles. | Feet.               |
| Ascending Westerly.—From the 1st to 7th mile...  | 47½ to 53               | 5.3    | 259                 |
| do 21st 38th " ...                               | 32 to 53                | 10.4   | 496                 |
| do 45th 50th " ....                              | 35 to 53                | 4.3    | 191                 |
| Descending Westerly.—From the 40th to 44½th mile | 47½ to 53               | 4.5    | 229                 |
| do 91st 96th "                                   | 53 —                    | 5.2    | 274                 |

As the survey terminates at the bottom of the Assiniboine Valley, above Fort Ellice, the prairie level on the northern side must be regained, involving an ascent of about 300 feet.

The principal gradients on the North-Western line are :—

|                                                 | CHARACTER OF GRADIENTS. |        |                     |
|-------------------------------------------------|-------------------------|--------|---------------------|
|                                                 | Feet per mile.          | Length | Total rise or fall. |
|                                                 |                         | Miles. | Feet.               |
| Ascending Westerly.—From the 1st to 7th mile... | 47½ to 53               | 5.3    | 259                 |
| do 18th 33rd " ...                              | 37 to 53                | 10.3   | 560                 |
| do 38th 44th " ...                              | 32 to 53                | 6.3    | 263                 |
| do 98th 103rd " ...                             | 47½ to 53               | 4.2    | 216                 |
| Descending Westerly.—From the 33rd to 38th mile | 32 to 34                | 3.8    | 133                 |
| do 92nd 98th "                                  | 42 to 45                | 5.9    | 277                 |

On the remaining 150 miles, other deep valleys have to be crossed, the principal being Shell River and the Assiniboine.

The Western line passes over ground, to the east of the Little Saskatchewan, 1,794 feet above sea level. The North-Western line attains an altitude east of the same river of 1,800 feet, and on the slope of the Riding Mountain, to the east of Bird Tail Creek, of 2,050 feet. To give some relative idea of these elevations, I may mention that the section now under contract through Manitoba will average less than 850 feet above the same datum.

The work on both lines is heavy for a railway through a prairie country, due in some measure to the endeavour to keep the several long ascending and descending gradients under 53 feet per mile. This has the effect of raising the average earth excavation, according to Mr. Smith's estimate, to about 16,000 cubic yards per mile.

The surveys to the extent they have been made have been successful in establishing that workable lines can be had in the directions described. The engineering features presented by the surveys of the Western, as well as the Northwestern line, as the tables of gradients indicate, are not so favorable as could be desired, but I am aware that the Government attaches great importance to carrying the railway through this section of desirable country for settlement; that the settlers themselves have strong claims on the Government for a means of communication, and that it is the speedy occupation of the land and the cultivation of the soil by prosperous settlers, that will lead to the successful working of the railway and the general advancement of the country.



Mr. Smith has projected another line "diverging from a point near the 8th mile" (from the boundary of Manitoba), and taking a south-west course, which strikes the "Valley of the Assiniboine at a little above the Grand Rapids. This would be about "33 miles in length, across a plain of rich land, on which there are a number of settlements, and construction would be very easy."

I have carefully examined all the data at command, and I think that a modification of the latter line points to a scheme worthy the consideration of the Government. If the Railway be carried to a point in the Valley of the Assiniboine, near the mouth of the Little Saskatchewan, where the land remains unsurveyed and ungranted, there might here be established the site of a city which would shortly become important. This extension would be from 50 to 60 miles west of the boundary of Manitoba, and about 150 miles west of Red River. It would avoid the very elevated ground, east of the Little Saskatchewan, passed over by the other lines, and which involves ascending and descending gradients of great length; it would have no heavy adverse gradients from the west, and taken with the sections now under contract, it would form a trunk line, extremely favorable for cheap transportation, all the way from Lake Superior to a point commanding a fine agricultural country, and from which desirable colonization lines might, in the near future, diverge (1) to the northwest (2) to the west and (3) to the south-west, and thus the projected city would become an important railway and business centre.

The line stretching from this projected point of junction to the north-west would pass up the Valley of the Little Saskatchewan and across to Bird Tail Creek, probably intersecting the north-west line, as recently surveyed, near the crossing of that stream, and thence on its projected course to a point on the located line west of Livingstone. One of the other lines from the point of junction would tap the coal deposits which are known to exist north of the International Boundary, and the entire absence of heavy adverse gradients on the trunk line to the east would admit of coal being delivered in the Province of Manitoba at very low rates. The line diverging to the south-west would serve the country along the Valley of the Souris and, if extended beyond the International Boundary line, would run directly to the Yellowstone Valley, and would render it practicable in the future to tap that region and draw its traffic into Canadian channels.

The extension from the end of Contract 48 (John Ryan's contract) to the point referred to near the mouth of the Little Saskatchewan, might at once be put under contract in the same manner that Contract 48 itself was let. As soon as possible thereafter, the line up the Little Saskatchewan and to the north-west may be placed under contract. I would advise that the latter line be located as a cheap surface line, that deep excavations high embankments and heavy work, with the view of securing low gradients, be avoided. That the great aim be to have the rails laid through the district with any reasonable gradients and curves that can be worked by light trains—of course, taking care that the best align-

ment and gradients which the peculiar features of the country will admit of be secured, without unnecessarily increasing the expense. I would aim at having as useful a line as can be had and as cheap as it is possible to make it.

The length of this line would be somewhat increased by taking the course suggested. This would be a disadvantage more than compensated, it is considered, by the greater breadth of fine country rendered available for successful settlement. The line, besides answering colonization purposes, would connect, west of Livingstone, with the line located to Yellowhead Pass, and would afford facilities for construction and settlement in the direction of Edmonton and as far as the prairie region extends.

I respectfully submit this suggestion for consideration. Besides aiming at securing, without delay, a through communication sufficient for all present purposes and affording facilities to settlers to occupy desirable land, the project has in view other objects, the importance of which I feel assured the Government will recognize.

The adoption of the line to the point I have indicated in the valley of the Assiniboine, near the mouth of the Little Saskatchewan, would provide 160 miles of an excellent trunk line leading from Winnipeg and Selkirk to the coal deposits, would to that extent make provision for the supply of fuel, where no timber now exists, and thus anticipate a want already sorely felt in many quarters. The laying out of a town or city at the point mentioned, and the location of stations at regular intervals on other ungranted lands along the line, would secure to the Government, all the benefit arising from the enhanced price which would be given to the land, to assist in meeting the cost of the railway.

I herewith submit two plans, one showing in blue the ungranted blocks of land, one mile square, suitable for stations, through the Province of Manitoba, and as far as the proposed town site at the mouth of the Little Saskatchewan. The other plan shows the several lines referred to; the approximate lengths as compared with the old located line, by the Narrows of Lake Manitoba between common points, Selkirk and Nut Hill—the latter about 60 miles west of Livingstone—may thus be stated :

#### SELKIRK TO NUT HILL.

|           |                                    |            |
|-----------|------------------------------------|------------|
| By No. 1. | The North-Western Line .....       | 350 miles. |
| " 2.      | The Western Line .....             | 365 "      |
| " 3.      | The Southern Line .....            | 370 "      |
| "         | The Narrows of Lake Manitoba ..... | 330 "      |

I have the honor to be, sir,

Your obedient servant,

SANDFORD FLEMING,

*Engineer-in-Chief.*



## CANADIAN PACIFIC RAILWAY.

OFFICE OF THE ENGINEER-IN-CHIEF,

OTTAWA, June 14th, 1879.

## MEMORANDUM OF INSTRUCTIONS FOR MR. MARCUS SMITH.

The Hon. the Minister has authorized the undersigned to instruct Mr. Smith to proceed to the prairie region and conduct certain explorations and surveys.

These explorations and surveys are confined to the district between the Red River and the south branch of the River Saskatchewan.

The object of the examination is to find the most eligible line for the railway, having in view its passing conveniently near the greatest extent of land suitable for settlement, between Selkirk and the crossing of the Saskatchewan, about latitude  $52^{\circ} 20'$ .

Mr. Wm. Murdoch has been furnished with instructions bearing date May 23rd last, a copy of which is attached. These instructions cover the survey operations between Red River and the western boundary of Manitoba. It was intended to direct Mr. Murdoch, on the completion of all the work necessary within the Province of Manitoba, to extend the surveys westerly towards the Saskatchewan.

It is, however, advisable to lose no time in gaining the information desired. Accordingly, Mr. Smith is instructed to proceed at once to the district referred to. He will personally explore the country west of the Province of Manitoba, to determine where an instrumental survey should be made. He will be supplied with assistants in order that the exploration may be followed up by an instrumental survey.

Mr. Smith has already made some explorations in this district; he will the more easily determine the best points for crossing the several rivers. Possibly he could at once start the survey party, say at the Little Saskatchewan, east of Fort Ellice, thence to work westerly in a direction which the exploration to be made, will establish.

In the event of this instrumental survey being commenced at the Little Saskatchewan, Mr. Smith will send information to Mr. Murdoch of the fact, with instructions to extend his surveys to that point, and there form a connection with the levels and measurements.

The crossing of the south branch of the main Saskatchewan by the located line may be taken as the extreme westerly objective point. Mr. Smith will use his best efforts to find the best line that can be had, following the general direction of the Touchwood Hills and passing the elevated ground to be met, either to the north or south.

Although the crossing of the South Saskatchewan may be taken as the westerly objective point, Mr. Smith, while in that quarter, will sufficiently examine the country to ascertain if any advantage would be gained by making the connection with the present located line nearer the elbow of the North Saskatchewan.

The undersigned is aware that there are several very wide and deep valleys in the country to be traversed, west of the Riding Mountains, but he feels assured that Mr. Smith will be able to find satisfactory crossings, if such exist; and at all events he will be able to furnish a plan and profile, from actual survey of the best line which can be had, between the crossing of the south branch of the main Saskatchewan and the proposed point on the Little Saskatchewan referred to.

Lest no line, in every respect satisfactory, be found south and west of the Riding Mountains, it is important to have a survey made to the east, Mr. Smith will accordingly instruct Mr. Murdoch, after completing the service upon which he is now engaged, and closing his work on the Little Saskatchewan, to survey a line around the south-westerly end of Lake Manitoba, passing Dauphin Lake to the east, or to the west, as may seem best, and connecting with the located line at the most convenient point between the narrows of Lake Manitoba and Northcote.

These several surveys completed, and plans and profiles prepared, we shall have definite information, which will admit of a comparison, of three main routes between Selkirk and a common point on or near the south branch of the main Saskatchewan.

Mr. Smith will find in Mr. Murdoch's instructions and the accompanying letters full particulars with regard to the system of procuring supplies, making payments and keeping accounts. He will observe that the Purveyor's Branch is abolished, and that the engineer conducting the survey is himself now held responsible for the expenditure. Mr. Smith will be required to accommodate himself to the change.

The Hon. the Minister has selected the following assistants to accompany Mr. Smith.

W. D. BARCLAY,  
E. McNICOL,  
L. DESBRISAY,  
M. HARRIS,

Mr. Smith will forward progress reports as frequently as possible.

SANDFORD FLEMING,

*Engineer-in-Chief.*

## CANADIAN PACIFIC RAILWAY.

OFFICE OF THE ENGINEER-IN-CHIEF,

OTTAWA, December 30th, 1879.

REPORT ON SURVEYING OPERATIONS WEST OF THE PROVINCE OF MANITOBA, FOR THE YEAR 1879, BY MR. MARCUS SMITH.

In anticipation of a fuller report on the Surveys and Explorations made under my charge during the season of 1879, I beg to submit a few remarks on the two lines that have been surveyed; commencing at a common point on the western boundary of the Province of Manitoba, near the fourth base line, and extending westward and north-westward a distance of 100 miles respectively.

In 1877 a survey was made of the crossings of the Valleys of the little Saskatchewan, Bird's Tail Creek, Shell River and the Assiniboine, on a line following the southern trail to Shell Lake; thence direct to the junction of Shell and Assiniboine Rivers. This line was pointed out, by a deputation of the oldest settlers in the country, as following the centre of the fertile or permanent wheat-growing belt, consisting of a deep rich loam with a clay subsoil, extending northward to its extremity beyond the Riding and Duck Mountains and southward to the Assiniboine; the depth of soil, however, decreasing in that direction and the subsoil gradually varying from clay to gravel, boulders and sand. The examination of the country made last summer has generally confirmed this statement, and the centre of the belt most suitable for the cultivation of wheat and other cereals is shown approximately on the map herewith by the broad dotted line of brown colour.

The surveys, made in 1877, a little south of this line shewed that the bridging of the Valleys of Bird's Tail Creek, Shell River and the Assiniboine would be so enormously heavy as to render construction on that line impracticable, or at least inexpedient.

A line was therefore projected and surveyed during the past summer, shewn on the map herewith by a blue line, A B C D, which enters the Valley of the Assiniboine below the mouth of Bird's Tail Creek, crossing the latter on a flat, and avoiding Shell River altogether. The line is continued up the Valley of the Assiniboine to its junction with that of the Qu' Appelle, about four miles north-west of Fort Ellice; its total length from the Province boundary being 110 miles.

## DESCRIPTION OF THE LINE.

The altitude at the commencement on the western boundary of the Province of Manitoba—taken from Mr. Murdoch's survey of the line through that Province—is 992 feet above the level of the sea. Immediately west of this, the line rises up the slope or escarpment to the first terrace, with a gradient of 53 feet per mile, for nearly seven miles.

This slope has been furrowed and broken, by the drainage of the country, into a series of sand hills, which are partially covered with clumps of scrub oak, poplar and brush. It stretches from Riding Mountain south-westwards to the International boundary line, and is intersected, at intervals, by the Valleys of the White Mud, Assiniboine and other streams. The earth works on this section will be rather heavy, averaging 33,000 cubic yards per mile.

The altitude at the seventh mile is 1,268 feet. Thence to the 21st mile the country is nearly level, the altitude at that point being 1,252 feet. The surface, however, is indented with numerous small ponds and hollows. It is generally prairie, and the soil is good.

From the 21st mile, it rises gradually westward up to the 40th mile, where the altitude is 1,761 feet. The surface is rather lumpy, and partially covered with clumps and belts of poplar and scrub. The soil is good.

From the last point, the line begins to cross the Valley of the Little Saskatchewan obliquely, descending to the river, with a gradient of 53 feet per mile, for  $4\frac{1}{2}$  miles, where the altitude is 1,531 feet. The ascent to the table land on the west side of the valley, at the 49th mile, is made in  $4\frac{1}{2}$  miles, with gradients varying from 36 to 53 feet per mile.

The earthwork in crossing the valley will be moderate, averaging a little over 16,000 cubic yards per mile, for nine miles, and the river can be bridged with one span of 120 feet at a height of 15 feet above the surface of the water.

Recently, a town plot (Rapid city) has been laid out in this valley, about  $1\frac{1}{2}$  miles north of the line where a saw and a grist mill have been erected. There are also a few farm homesteads, recently taken up, on each side of the valley near the line.

The altitude at the west side of the valley near the 49th mile is 1,696 feet. Thence the course of the line is straight, up to the 91st mile on the left bank of the valley of the Assiniboine, where the altitude is 1,509 feet. The inclination is very gradual, but the surface of the country is rather lumpy, slightly undulating, indented with numerous ponds and narrow coulees. It is chiefly prairie, interspersed with clumps of poplar and brush. The soil is good till approaching the valley of the Assiniboine, the slopes of which, and a belt of the country adjoining, are composed of boulders and gravel, covered with a thin coating of vegetable soil.

From the 91st to the 96th mile the line descends obliquely the slope of the valley, with a gradient of 53 feet per mile, reaching the bottom of the valley near the mouth of Bird's-tail Creek, where the altitude is 1,236 feet. The earth works in descending from the table land to the bottom of the Valley of the Assiniboine will be heavy, averaging 39,000 cubic yards per mile for five miles.

Bird's Tail Creek can be bridged with one span of 100 feet, 12 feet above the surface water.

From the 96th mile the line follows the Valley of the Assiniboine up to the mouth of Qu'Appelle, at the 110th mile, with easy gradients, and the works would be light.

The bottom of the valley is about  $1\frac{1}{2}$  mile wide, the soil is good, being prairie, interspersed with groves of poplar and clumps of willow and brush. The south slope of the valley is densely wooded, and the north side is chiefly prairie with some clumps of poplar. On both slopes of the valley and the country adjoining, the soil is shallow, overlying a stratum of boulders, gravel and sand.

On a general average the works on this line will be moderate, the heaviest item being the earthwork, which is due to the rough country on the first 7 miles, and the heavy cuttings in descending to the Valley of the Assiniboine.

#### THE NORTH-WESTERN LINE.

This line commences at the same point as the last described, and follows the same course up to the 8th mile, where it diverges to the north-west, making a straight course to a point in the Valley of the Little Saskatchewan, where the northern trail crosses the valley. This is known as Tanner's Crossing, and a bridge has recently been erected over the river.

The line reaches the top of the eastern slope of the valley between the 33rd and 34th mile, where the altitude is 1,768 feet above sea level.

The character of the country and the soil up to this point is very similar to that on the other line.

The surveyed line crosses the Valley of the Little Saskatchewan obliquely on a course nearly due west, descending the eastern slope to the river with a gradient of 32 feet per mile for  $4\frac{1}{2}$  miles, and ascending the western slope at the rate of 42 feet per mile for  $5\frac{1}{2}$  miles. The excavations, however, are heavy, and in the location of the line for construction it would be expedient to make a deviation, by which the gradients on the eastern slope would be 42 feet, and on the western slope 53 feet per mile. This would shorten the line fully one mile, and reduce the quantity of earth excavations considerably. This, however, would still be rather heavy, and with our present information it has not been considered safe to estimate it at less than 29,000 cubic yards per mile for 9 miles. This, however, may possibly be reduced by a careful location survey.

The altitude at the 42nd mile, on the top of the western slope of the valley, is 1,876 feet; thence the course of the located line would be direct to the 89th mile, on the top of the eastern slope of the Valley of Bird's Tail Creek, but the surveyed line varies one to three miles north of the direct line.



From the 42nd mile the ascent is gradual, with slightly variable gradients up to the 85th mile, where the altitude on the surveyed line is 2,007 feet, but on the located line it will be about 1,980 feet. The summit altitude of the other line (at the 40th mile) is 1,761 feet, the more northerly line being farther up the slope of Riding Mountain, which falls gradually and imperceptibly to the eye southwards to the Valley of the Assiniboine.

The surface of the country between the 42nd and 89th mile is slightly undulating and indented with numerous small ponds, but the soil is of the richest quality. It has been covered with forests, which have been destroyed by fire. A few miles to the north of the line, belts of poplar have sprung up, being evidently a second growth, as a little farther to the north, on the margins of lakes and streams, and on the north-east slope of Riding and Duck Mountains, the primeval forests of spruce and tamarac still exists.

Throughout the whole space between the Little Saskatchewan and Bird's Tail Creek there are numerous settlements on both sides of the line, and those are rapidly increasing. The crops of wheat, barley, oats, and other agricultural products which we saw were extraordinarily heavy, but they were fully a month later than on the Qu'Appelle, where the substratum is gravel and sand.\*

The line descends the eastern slope of the valley of Bird's Tail Creek with a gradient of 42 feet per mile for 6 miles, on which the earth works will be moderate.

There will, however, be rather heavy trestle works in crossing two or three coulées formed by lateral streams.

Ascending the western slope of the valley, the gradient on the surveyed line is 53 feet per mile, but in location for construction, the line would ascend up the slope of the valley more obliquely and the gradient would be reduced.

The slopes of the Valley of Bird's Tail Creek, where the line crosses, splay out at an angle of inclination very much less than at a point a few miles lower down, where the trail crosses.

The soil is exceedingly rich and the crops of natural grass, pea vine and vetches are astonishing, reaching at places 4 feet in height, and as much as 6 tons of hay have been made from one acre of ground.

Both of these are good colonization lines, but the more northern line covers a greater breadth of fertile land which appears to be preferred by settlers, and is within easy reach of wood for fuel and for building purposes. Besides the saw mills at Rapid City, others are being erected farther up the river, north of both lines and nearer to the timber limits at the sources of the river.

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\* This was partly due to lateness in sowing on account of the wet spring. The average difference is about two weeks.

The bill of works and estimates herewith shew that the cost of construction would be about the same on each line.

Both lines could be extended westward to any point on the original line between the Assiniboine and the Saskatchewan at an average cost something less than on the sections above described.

Considered as a line for through traffic, the north-western line for the first 100 miles has the advantage of maximum gradients for traffic, eastwards of 42 feet per mile against 53 feet on the southern line. There will, however, be a gradient rising eastward from the Assiniboine on the northern line, which will be avoided on the other, but this is not expected to be heavy, probably it will be under 30 feet to the mile.

The northern line will also have the advantage for through traffic in being 10 to 15 miles shorter than the other if carried to the north of the Touchwood Hills. This, however, would be neutralized to some extent, if the line were carried as direct as practicable from the mouth of the Qu'Appelle to the elbow of the North Saskatchewan, Caerlaverock or any point further south. But I do not think it would be expedient to carry the line south of the Touchwood Hills, though the cost of construction would be moderate, more than one half the distance between the mouth of the Qu'Appelle and Battleford would be over a very poor and almost desert country of sand, gravel and boulders strongly impregnated with alkali.

The continuation of the line north-westward from the mouth of Qu'Appelle would, for the first 20 miles be over poor sandy soil, after which it would improve, and from the White Sand River to the telegraph line is a rolling park-like country with numerous lakelets and groves of poplar. The soil is generally very good.

The projected extension of the northern line is shown on the plan by the dotted line G. I. J ; it is probable, however, that the gradients on this line in crossing the valley of Shell River would be steep and the work heavy. Both of those defects can be avoided by carrying the line on the course F. H. J.

This would take us 10 to 15 miles north of the broad brown dotted line shewing the approximate centre of the fertile belt and close to the foot of Duck Mountain, on which the land is poor, but it would have the advantage of being so much nearer the forests of spruce and tamarac in which saw mills are being built.

The great drawback to settlement hitherto has been the difficulty of getting lumber for building purposes.

Should this northern line be adopted, I have projected a line diverging from a point near the 8th mile and taking a south-west course which strikes the Valley of the Assiniboine at a point a little above the Grand Rapids. This would be about 33 miles in length, across a plain of rich land on which there are a number of settlements, and construction would be very easy. It is on a direct course to the coal fields of the Souris.

This would be the commencement of the trunk line for a system of colonization railways to the south-west, and if constructed at once it would, at a small cost, greatly facilitate settlements in the Valley of the Assiniboine and the adjoining country between the Grand Rapids and Fort Ellice, the river between these points being navigable for barges and small steamers ; and when found expedient the extension of the line up the valley could be made at very small cost, the bottom flat of the valley being very favourable for railway construction.

Yours most truly,

MARCUS SMITH.

SANDFORD FLEMING, Esq.,

Engineer-in-Chief.

## CANADIAN PACIFIC RAILWAY.

## BILL OF WORKS for 100 Miles West of Manitoba.—Western Line.

| Description of Work.                                                        | Approximate Quantities. |           | Rates.  |              | Amount.      |
|-----------------------------------------------------------------------------|-------------------------|-----------|---------|--------------|--------------|
|                                                                             |                         |           | \$ cts. |              | \$ cts.      |
| Clearing, very light, mostly brush.....                                     | Acres.                  | 150       | 16 00   | per acre...  | 2,400 00     |
| Close cutting.....                                                          | "                       | 5½        | 30 00   | per " ...    | 165 00       |
| Grubbing.....                                                               | "                       | 5         | 60 00   | per " ...    | 300 00       |
| Fencing, 100 miles.....                                                     | L. feet.                | 1,056,000 | 05      | L. foot....  | 52,800 00    |
| Earth excavation, including borrowing surface drains and foundations, &c... | C. yds.                 | 1,550,000 | 25      | C. yard ...  | 387,500 00   |
| Under drains.....                                                           | L. feet.                | 1,000     | 35      | L. foot....  | 350 00       |
| Crib-work in abutments of bridges, including stone filling.....             | C. yds.                 | 920       | 4 00    | per C. yard. | 3,680 00     |
| Bridge Superstructure, Howe Truss....                                       | 1 span.                 | 120       |         |              | 5,000 00     |
| Bridge Superstructure, Howe Truss....                                       | 1 span.                 | 100       |         |              | 4,000 00     |
| Piles driven.....                                                           | L. feet.                | 1,760     | 40      | per L. foot. | 704 00       |
| Square timber in trestle bridges and culverts.....                          | C. feet.                | 188,500   | 35      | per C. foot. | 65,975 00    |
| Spruce plank.....                                                           | F. B. M.                | 13,500    | 25 00   | M.....       | 337 50       |
| Oak plank.....                                                              | "                       | 1,800     | 50 00   | M.....       | 90 00        |
| Wrought iron.....                                                           | Lbs.                    | 72,500    | 10      | per lb....   | 7,250 00     |
| Cast iron.....                                                              | "                       | 20,500    | 08      | per " ....   | 1,640 00     |
| Spikes, iron.....                                                           | "                       | 1,125     | 08      | per " ....   | 90 00        |
| Public road crossings.....                                                  | No.                     | 50        | 150 00  | each.....    | 7,500 00     |
| Private road crossings.....                                                 | "                       | 200       | 15 00   | each.....    | 3,000 00     |
| Track laying.....                                                           | Miles.                  | 104       | 250 00  | per mile ..  | 26,000 00    |
| Ties, 104 miles, 2,400 per mile.....                                        |                         | 250,000   | 30      | each.....    | 75,000 00    |
| Carriage of rails from beginning of contract, average 50 miles.....         | Tons.                   | 10,400    | 80      | p. ton p. m. | 8,320 00     |
| Ballast 104 miles, 2,000 cubic yards per mile.....                          | C. yds.                 | 208,000   | 30      | per C. yard  | 62,400 00    |
| Points and crossings.....                                                   | Sets.                   | 30        | 50 00   | per set....  | 1,500 00     |
| Station buildings.....                                                      | No.                     | 12        | 2500 00 | each.....    | 30,000 00    |
|                                                                             |                         |           |         |              | \$746,001 50 |

## CANADIAN PACIFIC RAILWAY.

BILL OF WORKS 100 Miles West of the Province of Manitoba.—North-western Line.

| Description of Work.                                                        | Approximate Quantities. |           | Rates.  |               | Amount.      |
|-----------------------------------------------------------------------------|-------------------------|-----------|---------|---------------|--------------|
|                                                                             |                         |           | \$ cts. |               | \$ cts.      |
| Clearing, very light, mostly brush .....                                    | Acres.                  | 190       | 16 00   | per acre...   | 3,040 00     |
| Close cutting.....                                                          | "                       | 10        | 30 00   | " ...         | 300 00       |
| Grubbing.....                                                               | "                       | 9         | 60 00   | " ...         | 540 00       |
| Fencing, 100 miles.....                                                     | Lineal feet             | 1,056,000 | 05      | per lin. ft.. | 52,800 00    |
| Earth excavation, including borrowing, surface drains, foundations, &c..... | Cubic feet.             | 1,600,000 | 25      | per cub. yd   | 400,000 00   |
| Under drains.....                                                           | Lineal feet.            | 1,000     | 35      | per lin. ft.. | 350 00       |
| Crib work on abutments of bridges, including stone filling.....             | Cubic yds.              | 920       | 4 00    | per cub. yd   | 3,680 00     |
| Bridge superstructures, Howe truss.....                                     | 1 span.                 | 100       |         |               | 4,000 00     |
| " " " " .....                                                               | 1 "                     | 80        |         |               | 2,600 00     |
| Piles driven.....                                                           | Lineal feet.            | 1,780     | 40      | per lin. ft . | 712 00       |
| Square timber in trestle bridges and culverts, &c. ....                     | Cubic feet.             | 170,000   | 35      | per cub. ft.  | 59,500 00    |
| Spruce plank.....                                                           | F. b. m.                | 16,000    | 25 00   | M.            | 400 00       |
| Oak " .....                                                                 | "                       | 2,000     | 50 00   | " ..          | 100 00       |
| Wrought iron.....                                                           | Lbs.                    | 70,000    | 10      | per lb. ....  | 7,000 00     |
| Cast " .....                                                                | "                       | 21,500    | 08      | " .....       | 1,720 00     |
| Spikes.....                                                                 | "                       | 1,300     | 08      | " ..          | 104 00       |
| Public road crossings .....                                                 | No.                     | 50        | 150 00  | each.....     | 7,500 00     |
| Private " " .....                                                           | "                       | 200       | 15 00   | " .....       | 3,000 00     |
| Ties, 104 miles, 2,400 per mile.....                                        |                         | 250,000   | 30      | " .....       | 75,000 00    |
| Carriage of rails from beginning of contract, average 50 miles.....         | Tons.                   | 10,400    | 80      | p. ton p. m.  | 8,320 00     |
| Track-laying.....                                                           | Miles.                  | 104       | 250 00  | per mile...   | 26,000 00    |
| Ballast, 104 miles, 2,000 c. yd. per mile .....                             |                         | 208,000   | 30      | per cub. yd   | 62,400 00    |
| Points and crossings.....                                                   | Sets.                   | 30        | 50 00   | each.....     | 1,500 00     |
| Station buildings.....                                                      | No.                     | 12        | 2500 00 | " .....       | 30,000 00    |
|                                                                             |                         |           |         |               | \$750,568 00 |